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(71) Applicant (for all designated States except US): ELECTRIC FUEL LIMITED [IL/IL]; Western Industrial Park, P.O. Box 641, 99000 Bet Shemesh (IL).

## (72) Inventors; and

(75) Inventors/Applicants (for US only): SHRIM, Yaron [IL/IL]; 20/1 Mazel Shor Street, Jerusalem (IL). GIVON, Menachem [IL/IL]; Kibutz Shoval, DN Hanegev (IL). DOPP, Robert, B. [US/US]; 1925 Fields Pond Glen, Marietta, GA 30068 (US). ROSENBERG, Tzvi [IL/IL]; 1 Hashikmah Street, Mevaseret Tziyon (IL).

(74) Agent: CATAN, Mark, A.; Lyon & Lyon LLP, 633 West Fifth Street, Suite 4700, Los Angeles, CA 90071-2066 (US).

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(54) Title: BATTERY PACK DESIGN FOR METAL-AIR BATTERY CELLS

## (57) Abstract

A high capacity primary (single-use; non-rechargeable) battery pack for high current portable appliances such as cellular phones employs electrochemical cells that use ambient oxygen for one of the electrodes. The pack makes possible a simple low cost design by providing for oxygen supply in a completely passive yet compact configuration. To provide for compactness while providing the high gas exchange rates required of high current devices in a passive air management design, a variety of design tactics are developed and applied in various embodiments. Cells may be arranged inside a housing in a tightly packed arrangement by providing internal spaces that are sized to permit diffusion and, if possible, bulk air flow. The highest volumetric energy density is achievable by permitting bulk flow of air into the housing. The free exchange of gases while preventing the entry of water into the area containing the cells is addressed by encapsulating the cells in a water-impermeable material with a gas-permeable portion. In a preferred configuration, the cells are arranged in trays and sealed in the trays with porous Teflon of the cell surfaces that exchange gases.

